

From Jerry Jenkins and David
E. Sisk, eds., Development by
Consent: The Voluntary Supply of Public
Goods and Services (San Francisco:
ICS Press, 1993)

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From Privies to Boulevards: The Private Supply of Infrastructure in the United States during the Nineteenth Century

During the late 1970s, the term *privatization* first came into common currency to describe a process which was then emerging. Whether or not the term itself is of recent origin, there is no doubt that the reality of privatization has deep historical roots. Throughout the nineteenth century, the private sector played a major (often dominant) role in nearly every imaginable service now monopolized by government.¹

Despite the long history of private provision, historians, at least until recently, have not paid it much concern. When mentioned at

all, it was usually dismissed out of hand as a disgraceful mark of primitivism only worth remembering as a lesson of what not to do. Since the 1970s, however, these assumptions have come under challenge from several quarters. Recently, historians have proved much more willing than their predecessors to evaluate private provision on its own terms rather than as a barbaric precursor to municipalization.²

This literature, although still quite scant, indicates rich opportunities for research. Most of all, it points to the enormous complexity in the meaning of the term *private*. The line between public and private (especially when it came to services such as law enforcement, utilities, and schooling) was vague indeed during the nineteenth century. Much of the time, the norm was a hybrid between these two extremes. Thus a simple reading of the literature on private provision can confuse more than enlighten.

The focus of this chapter will be limited to infrastructure (streets, sewers, and other utilities) rather than trying to cover the entire gamut. For lack of better terminology, I will separate the methods of private infrastructure into three broad categories: the exclusive franchise, the overlapping competitive franchise, and free market provision. To be sure, many examples did not fit any of these or, more often, straddled the lines between them. At best, each category represents an ideal type which can offer an opportunity to inject some discipline into the discussion.

The Exclusive Franchise

The exclusive franchise, which today is the most common variety of private provision, generally meant that a municipal government, through some sort of bidding process, would grant a monopoly to a single company to provide a service, such as sewerage collection or turnpike administration, connected with the public street easement. As part of the franchise, the company would receive certain special powers not enjoyed by most businesses, such as eminent domain.

Franchises stipulated that the holder, in return for these powers, abrogate some measure of control over the determination of rates and location of service areas.

Sewers. During the nineteenth century, several cities, including New Orleans, Phoenix, and Atlantic City, granted exclusive franchises to private companies to operate their sewer systems. Most of these sewer companies charged a sliding scale of fees geared to various classes of customers. The Atlantic City Sewerage Company typified this approach by setting rates based on the number of rooms and the type of structure served (such as, hotel, lodging house, or factory).³

Private sewer arrangements were especially common, and probably most successful, in small- and medium-sized cities. Atlantic City's company, for example, generally received satisfactory ratings, while New Orleans's experience with a sewer franchise was comparatively negative. In the case of New Orleans, the city granted two successive franchises in the 1880s and 1890s. The first company failed to begin construction, while the second lapsed into bankruptcy after laying only 3,600 feet of pipe. The city government ultimately bought out the franchise and completed the system. By 1902, no city with a population of over thirty thousand still had a private sewer company.⁴

What can explain the apparent geographical disparity in the quality of service between small and large urban areas? Put another way, Why were private sewer companies most successful in small- and medium-sized municipalities? Probably the most persuasive theory has been advanced by historian Stephen Davies. Davies speculates that there may be an optimum size of population and geographical area for certain utilities beyond which efficiency and profitability decline. More specifically, if the service area expands too far beyond limits set by market demand, revenue earned by the company can no longer sustain the resulting higher transaction and capital costs. On the other hand, if the market (not the political authorities) determines the utility's rate of geographical growth, "the costs are borne by the beneficiaries . . . who can therefore trade off

costs and benefits. After a point, the costs start to exceed the benefits. When that happens, left to itself, the market would signal this by a failure to supply or an undersupply of public goods," thus leading to a check on urbanization or at least a different pattern of urban growth, perhaps in the form of medium-sized towns instead of large cities. While Davies's main concern was with the history of private water provision in Great Britain during the nineteenth century, his explanation may apply with equal, or greater, force to the United States. Indeed, the main criticism leveled against private suppliers at the time was not poor service per se but a reluctance to expand to outlying areas. As Davies himself cautions, however, this theory is still suggestive and needs better grounding in both empirical and theoretical research by economists and historians.⁵

If Davies is correct, two related questions come to mind. First, to what extent did legal mandates, such as franchise requirements that companies cover extensive geographical areas, push beyond this natural limit and thus exacerbate (or perhaps cause) the failure of private systems? Secondly, what role did politics, including grants of eminent domain and monopolies on the use of city street easements, play in determining the type of sewerage technology cities adopted? In any case, Davies has underlined the need for greater scrutiny of the conventional wisdom that centralized sewerage was (or is) the single best system. My own guess, as I explain later, is that the market (had it been left to develop freely) would have favored more decentralized technologies.

The private sector was also important in the development of sewerage recycling facilities. The current recycling craze is not new. Many of its elements can be traced back to the nineteenth century. The decision by a city to install a recycling facility was usually not a matter of choice. In almost all cases, it resulted from adverse litigation brought by downstream individuals against municipal sewage pollution. Even then, recycling plants were the exception, not the rule. Until the 1930s, the vast majority of municipalities merely dumped their raw sewage into the nearest waterway (Tarr et al. 1984, 245-46).⁶

The private sector was extensively involved in the most publicized type of recycling during the late nineteenth century: sewage (or broad) irrigation. This took several forms. In some cases, such as Phoenix, Arizona, and Pullman, Illinois, one company controlled both the sewer system and irrigation facilities. More frequently, the city government either owned a farm or contracted directly with farmers in need of irrigation. It was not uncommon for the raw sewage to be pumped directly through pipes to fields for application. While much of the success or failure of these efforts depended on the crops grown and the type of soil, the sewage, composed of elements such as nitrogen, potash, and phosphorus, had great value as fertilizer.⁷

Sewage farming was most prevalent in western urban areas such as Los Angeles, Pasadena, Colorado Springs, and Salt Lake City. This was due in great part to the relative scarcity of water and the wide availability of land suitable for irrigation. The system of water ownership also may have been a factor. In contrast to the riparian water law of the eastern states, prior appropriation (which established a quasi-private ownership of water) predominated in the arid West. Prior appropriation not only put a high premium on water conservation but also may have more readily encouraged individual users to bring suit against municipal polluters, thus forcing the construction of disposal facilities (Rafter and Baker 1894, 539-59).

The early twentieth century brought a reversal in the trend toward sewage irrigation. Why? Most of the evidence indicates that it had, at best, a mixed record of profitability. At the time, critics put the blame on the technology itself. A common complaint, voiced in Los Angeles and elsewhere, was that sewage eventually saturated the soil, rendering the land "sewage sick" and therefore unsuitable for agriculture for several years. There were also health dangers, including the perception, either real or imagined, that fields irrigated with sewage were breeding grounds for disease (ibid., 8, 234, 466-67).

These flaws associated with sewage irrigation need to be put into context. Many may not have been endemic to the technology itself but rather to its misuse, including the tendency of many farmers,

unfamiliar with the practice, to overapply sewage to their fields or fail to make provision for storage of extra supplies. This was, after all, an infant technology, still in the experimental stage. Whatever the reasons, by the early twentieth century, it was not only an infant technology but also an arrested one. Few cities made new attempts to build facilities and many of those in operation fell into disuse. Only a few years before, sanitary and engineering experts had touted sewage irrigation as a panacea. Now, they dismissed it as a hopeless failure.⁸

The failure of sewage irrigation was probably more than one of technology (misapplied or not), or even economics. It also may have been politically determined. Quite simply, the political and legal environment gave cities few, if any, incentives to recycle or even treat their sewage. Local governments could exercise a virtual blank check to dump their untreated or partially treated sewage in the free public waterways. By the early twentieth century, the increased political monopolization over streams and lakes further weakened any private incentive to protect existing water supplies from pollutants.

This trend toward increased government ownership created an environmental "tragedy of the commons." Garrett Hardin coined the phrase to describe a situation in which individuals have no incentive to preserve a resource because nobody has a secure property entitlement. The fact that municipalities and private sewer companies had relatively free rein to dirty the public water supply weakened any motivation to perfect sewage irrigation and other recycling technologies. In the tragedy of the commons, Hardin notes, the "rational man finds that his share of the cost of the wastes he discharges into the commons is less than the cost of purifying his wastes before releasing them" (Hardin 1977, 22).

The very power to choose which variety of sewerage technology to install also meant that cities could shape in crucial ways both the evolution and form of the technology itself. An illustration of this phenomenon was the decision of most major localities during this period to build water-carriage (or combined) sewer systems. The

chief characteristic of water carriage was that it combined storm and waste water in one pipe, thus saving vast expense on construction and flushing. Separate sewers, the alternative that cities rejected, did not have these advantages and necessitated two sets of pipe, one each for storm and waste water (Tarr et al. 1984, 233-40).

Although cheaper than the separate system, water carriage had a major drawback. Because of the tremendous flow of water through the common pipe, it rendered many treatment and recycling technologies, such as sewage irrigation, either ineffective or too costly. For many municipal governments, it was worth the trade-off, because they had the option of dumping their raw sewage in waterways. Hence, as Joel Tarr has shown, water-carriage not only resulted in more pollution, but also set the stage for increased outbreaks (at least in the short term) of typhoid and other waterborne diseases for downstream populations.⁹ The installation of water carriage and the subsequent abandonment of sewage irrigation reveal once again the critical influence played by government in the determination of the sewerage technology of choice (Baker, 1896, 23).

Turnpikes. No general survey of private provision of infrastructure during the nineteenth century would be complete without some discussion of turnpikes. The building of turnpikes represented one of private enterprise's most impressive achievements during this period. In many ways, the turnpike charter, issued by state governments, resembled the municipally issued exclusive franchise. Typically, both granted a private company special powers (such as eminent domain) in return for specified operating restrictions. In the case of turnpikes, this entailed requirements on location of toll gates, amount of tolls, and service area. On several other matters, the turnpike charter was more akin to a normal incorporation charter. Turnpike charters, unlike, say, franchises, rarely included justifications of "public utility" (Klein and Majewski 1991, 24).

For many decades, research on the history of turnpikes was almost exclusively the domain of antiquarians. Fortunately, in the last few years economic historians such as Daniel Klein and John

Majewski have devoted much more attention to the subject. Their work has revealed the enormous impact of turnpikes on American economic and social life during the nineteenth century. Before 1845, for example, there were over four hundred turnpike projects initiated in New York alone. They introduced an efficient road system through which countless entrepreneurs and customers could for the first time bypass costly sea and river trading routes (Klein 1990, 811–12; Klein and Majewski 1991, 57).

Turnpikes were often extremely expensive to build. The average cost per mile of construction was fifteen hundred dollars, and the length could be as much as fifty miles. Generally, they lost money for their owners. Even so, investors were always ready to step forward and initiate new, and often quite massive, projects. How can this seemingly irrational economic behavior be explained? According to Klein, it had to do with significant indirect benefits for businesspeople, such as improved land values and access to markets. In 1811, for example, a promoter of turnpikes entreated the “People of Pennsylvania” to realize the collateral benefits, which included “enabling you to carry your produce and manufactures to every market, and in raising the value of your woods as well as your cleared lands” (Klein and Majewski 1991, 55; Klein 1990, 796).

Because the era of private turnpikes spanned more than a century, there are ample research opportunities for interested historians. Klein and Majewski have pointed to the need to further examine the regulator’s role in the demise of the turnpike, the profitability record of individual companies, the impact of indirect benefits as stimulants to investment, and comparisons with similar private projects such as bridges. For those leery of government involvement, the authors have raised some troubling challenges. Could the turnpike have functioned without eminent domain? The evidence they found makes this appear doubtful, bringing to the fore another question: Did the reliance on eminent domain open the door for government officials to impose ever more intrusive regulations to safeguard the general welfare and thus ultimately seal the doom of turnpikes?

The Overlapping Competitive Franchise

By the end of the nineteenth century, another form of private infrastructure supplier had become increasingly common: the overlapping competitive franchise. Until about 1910, many city governments—including Chicago, New York, and Los Angeles—granted private companies overlapping franchises in certain utilities such as telephones, electricity, and streetcars. These franchises allowed two companies to compete within a specified geographical area, ranging all the way from a block in certain cases to an entire city in others.

There is a growing body of historical literature on the overlapping franchise. The best recent work on this subject is Harold Platt’s *City Building in the New South: The Growth in Public Services in Houston, Texas, 1830–1915*. Platt’s case study of Houston generally praises the record of utility competition, citing two major benefits. First, competition in telephone, electricity, and streetcars served to keep rates low and secondly, the search for customers forced utilities not only to be more efficient but to rapidly expand into outlying areas. When Houston allowed streetcar competition in the early 1880s, for example, the miles of track more than tripled, extending service to previously deprived locations. During the same period, the officially protected electric and water monopolies kept rates high and refused to budge beyond the lucrative business district (Platt 1983, 135–40).

Christopher Armstrong and H. V. Nelles found similar benefits to competition in their study of Canadian utilities from 1830 to 1930. Cities such as Toronto and Montreal were scenes of intense competitive battles in endeavors ranging from water supply to telephones. Much like Platt, the authors discovered a common life cycle for Canadian utilities: first, a conservative monopoly would be challenged by an upstart; second, a fierce competitive battle would ensue resulting in lower rates and extended service; and lastly, the two firms would consolidate. Even so, the new monopoly could never rest secure as the cycle always threatened to repeat itself. “Competition,” Armstrong and Nelles observe, “did not wither away

once dominant firms began to emerge in local utilities markets; indeed, the late nineteenth and early twentieth century witnessed a surprising resurgence of competitive forces, which owners and managers of utilities had either to surrender to or surmount" (Armstrong and Nelles 1986, 93).

As illustration, they quote a complaint from the head of the monopoly-holding Buffalo Gas Company that "as for opposition companies we are perpetually threatened with them. . . . We must simply take them as they come and defend ourselves like good Christians against the assaults of the devil" (ibid., 23). The examples cited by Armstrong and Nelles seem to fit economist William J. Baumol's description of a "contestable market" that remains competitive even when a single company has a monopoly. According to Baumol, "freedom of entry, indeed the mere threat of incursions by entrants into the market, may effectively discipline the monopolist, even if entry is never successful. . . . Potential competition can also force the monopolist to produce with maximal efficiency, and to hunt down and utilize fully every opportunity for innovation" (Baumol, Panzer, and Willig 1982, 22).

It would be a mistake, however, to confuse the overlapping competitive franchise, or as Platt calls it, "regulated competition," with a free and untrammelled market. Because municipal governments owned, and thus heavily regulated, the arena where competition took place (the public street easement), they could also in great part influence the form this competition would take. Moreover, cities frequently appended to franchises a multitude of regulations on rates, on the possible number of entrants, and on service areas. Sometimes regulators forced utilities to compete when the market might have favored consolidation; in other cases they imposed monopoly (through the exclusive franchise) when competition made more sense (Platt 1983, 135).

Political ownership of the street easement often led to Hardin's tragedy of the commons. The fact that each utility did not have a secure property entitlement set the stage for constant wrangling over such normally mundane matters as the location of each

company's pipes and lines and responsibility for repaving after repairs. On a single street, one or more companies and municipal agencies might have streetcar tracks, telephone and electric lines, and pipes for steam heat, sewers, and water. Sometimes not even the municipal government knew where everything was.¹⁰

Free Market Competition

Both the exclusive franchise and the overlapping competitive franchise usually rested on a legal rationale of municipal ownership of the playing field on which competition took place: the street easement. Such was not the case with the third variety of private infrastructure: free market provision. It occurred in a context of both private property and open entry similar to that of ordinary goods and services in the economy.

Streets. One of the most fascinating examples of free market provision were the private streets or (in the jargon of the locals) "private places" of St. Louis. Between 1867 and 1920, about ninety such places were laid out within the city limits. In most cases, the subdivider installed the infrastructure (usually streets, sewers, and water mains); then he deeded this over to a group of trustees. He attached to this deed a governing indenture or restrictive covenant. The trustees, acting for the lot owners, had the authority to deny services to residents delinquent in their assessments and, as a last resort, to sue in a court of equity to compel payment. When a trustee died, resigned, or moved from the subdivision, most indentures allowed the lot owners to elect his or her successor. Ultimately, this devolution democratized the governance of the private place.¹¹

The designer of most of the early private places was architect, urban surveyor, and real estate developer Julius Pitzman. He may have been influenced by models such as Llewellyn Park, New Jersey. Laid out in 1856, Llewellyn Park was the most famous residential real estate development of the period. It had virtually all the elements of the later private places, including private streets

(marked off by gates) and parks owned by a board of trustees (Jackson 1985, 76–81; Vickery 1972, 10).

St. Louis seems to have been the only large city where private places caught on in a big way. Historians have come up with several explanations for why this was the case. Few of these theories are satisfactory. Charles Savage, for example, maintains that the private place was a reaction to a lack of zoning. The problem with this argument is that although St. Louis did not have zoning until the twentieth century, neither did any other large city. Others have asserted that the private place arose to cope with rapid economic and population growth during the late nineteenth century. This explanation is also unsatisfactory. Many large cities, such as Chicago, also experienced rapid growth, yet did not develop private places, at least not to nearly the same extent (Savage 1987, 4).

While there is no single reason why the private place took hold in St. Louis, scholars have overlooked a persuasive explanation. Throughout the nineteenth century, the Missouri legislature kept the city on a particularly short fiscal leash through severe limitations on taxes, spending, and debt. The city's home-rule charter of 1875 tightened already strict restrictions by capping tax rates to one percent of assessed value, a limit not to be exceeded unless three-fourths of the voters approved. Street grading and initial paving could be undertaken only through a complicated system of special taxes levied on front footage.¹²

When compared to the ten largest cities, St. Louis was among the lowest in per capita taxes and spending. Corruption drained away a good share of the meager funds that were raised. During the Progressive Era, Lincoln Steffens nominated St. Louis as a prime candidate in his "shame of the cities" exposés. William Reedy, a local journalist and muckraker, summarized the situation succinctly when he wrote, "We [the city government] may have been bad but we were never bold." In 1890, St. Louis ranked ninth among the ten largest cities in the percentage of public street mileage not graded or paved, beating only Cleveland which, at 57 percent, came last on the list.

The definition of paved during this period was broad enough to encompass gravel.¹³

Even paved streets were in a shabby condition because of poorly conceived excavations. Both the city government and franchised utilities haphazardly ripped up pavement to lay down track, pipes, and wire. Endless stories of franchise corruption, spotty service, and the padding of street and sewer construction contracts filled the newspapers. In 1900, the *Mirror*, a local muckraking journal, painted a dark but reasonably accurate picture:

The job in legislation and the trick in the Board of Public Improvements which resulted in the streets of the city being unlighted over seven-tenths of its area.

The streets impassable, unswept, unsprinkled, while the pay roll of the street department has not been decreased with the stoppage of work.

The sewers choked at their mouths, shaky and crumbling throughout their length and all under great strain after every rain.

The foul alleys lined up with unremoved, putrefying garbage.

The depletion of the city treasury by the maintenance on the pay rolls of hordes of tax-eaters in the departments of public work, while practically no public work is being done.¹⁴

Other government policies, such as poor enforcement of ordinances requiring excavators to repave, encouraged free riding on city services. Many utilities and government agencies openly ignored edicts that pavement be restored after laying pipe, conduits, or streetcar track. An editorial in the *St. Louis Republic* charged that the average excavator was so oblivious to "the spirit of the law" that "he almost seems to think that streets should not be paved, because the improvement gives him inconvenience and extra expense."¹⁵

The moral of all this was clear for real estate developers. If they wanted infrastructure for their properties, they often had no choice but to install it themselves. Moreover, the constant publicity about franchise corruption and padding of construction contracts encouraged strategies, such as the private place, to keep control permanently beyond the reach of local government.

To attract patrons to their properties, private-place developers stressed to customers that they had avoided the kinds of costly mistakes endemic to political provision of infrastructure. Private ownership meant that the subdivider and lot association had maximum freedom to regulate and experiment with the design of the street. As a selling point, developers of Bell Place advertised that "house connections for water and gas are laid to the inside of curb lines, thereby avoiding the necessity of disturbing the street when seeking such connections." In Lewis, Westmoreland, Kingsbury, and other private places, Pitzman caused sewer and water mains to be laid under the park median. This avoided costly pavement excavations to effect repairs. Private-place indentures often limited electric and telephone lines to the alleys or to "easement strips" (owned by the association) along the side of the street. In the private place, the price of miscalculation was borne entirely by the developer or the homeowner—that is, by consenting parties who viewed the service as an economic asset. This was not always the case under the tax-funded alternative. Socialization of cost and benefit diffused responsibility and incentive to such an extent that tremendous opportunities were created for waste and duplication of infrastructure (Hunter 1982, 33; Vickery 1972, 9).¹⁶

The response to smoke pollution in St. Louis illustrates the differing strategies adopted by government and private-place associations to cope with free riders. Throughout the nineteenth and into the twentieth century, the city had a severe problem with pollution caused by the burning of bituminous or soft coal. A coalition of business, reform, and women's organizations struggled for enactment of a government ban on soft-coal burning for decades. They did not succeed until the 1920s. As early as the 1870s, on the other hand, several of the private places had enacted regulations prohibiting their residents from burning bituminous coal. Private-place associations discovered several ingenious methods to prevent soft-coal burning. The trustees of Washington Terrace, for example, required property owners connecting their houses with the subdivi-

sion's private sewers to sign contracts agreeing not to burn soft coal. If a violation occurred, the connection could be severed.¹⁷

A free rider in this case was someone who burned cheaper, pollutant-producing bituminous coal and thus took a free ride off the lungs of others. Until enough political pressure finally forced the city to pass a law, harmed parties were left essentially helpless. Private-place residents, by contrast, did not have to depend on the vagaries of the political process. Through the indenture they could, as economists have put it, achieve "internalization of externalities" (Buchanan and Faith 1981, 95). The experience of the private place turns conventional economic theory about the free rider on its head.

Purchasers of homes agreed, under the conditions of the indenture, to pay for infrastructure through assessments levied by the association. Any free rider who refused to pay, yet used the services, could be brought to terms through the legal devices contained in the restrictions. Moreover, residents had a direct economic stake in insuring effective assessment collection. When provided by governments, the costs and benefits of these services were widely spread or socialized on a grand scale. The free rider on the private place was a real person known to all concerned. On the public street, they were often faceless abstractions to their neighbors.

The private delivery of infrastructure depended heavily on what Mancur Olson called the "tied-sale" (1965, 133–34). Economist Harold Demsetz, who later refined the concept, commented that "it may be possible to tie in the consumption of a second product with consumption of the collective good, and private incentives may well exist for the production of the tied-in good because exclusion is possible" (1970, 293–306). In effect, the buyer of a home on a private place purchased a package deal that included tied infrastructure such as streets, sewers, water mains, and security. The use of the tied-sale took a variety of forms. In the 1880s, developers subsidized extension of a cable line into Hammett Place and Cora Place to increase salability. The Lindenwood subdivision, which does not

seem to have been a private place per se, boasted its own developer-constructed railroad station and spring-fed water works.¹⁸

The tied-sale was not peculiar to the private place. It has been embodied in numerous business arrangements throughout American history. Spencer MacCallum's comparison of the hotel and the town, notes several examples of tied-sales:

The hotel has its public and private areas, corridors for streets, and a lobby for its town square. In the lobby is the municipal park with its sculpture, fountains, and plantings. . . . Its public transit system, as it happens, operates vertically instead of horizontally. Utilities, including power and water service and sewerage, are all available. Police and fire protection come under the supervision of the house officer and security staff. (MacCallum 1970, 2)

A similar description of the shopping center and the condominium could also fit tied-sales.

Historians have begun to explore in greater detail the critical part played by the tied-sale in the provision of infrastructure. Ann Durkin Keating has underlined how developers in suburban Chicago formed light, water, and gas companies as part of "service combinations" to attract settlement to their subdivisions (Keating 1985, 23; Keating 1988), and Robert M. Fogelson has described how land developers in Los Angeles formed water companies and cable railways and even constructed thoroughfares as adjuncts to their properties. Significantly, these entrepreneurs harbored few illusions that their investments in infrastructure would ever turn a profit. The hope for payoff was more indirect. One investor in an interurban railway in Los Angeles admitted, "I have but little confidence in its running as an electric road," but "we need not count what we put in as a total loss—for it will help our land to the amount it has cost us" (Fogelson 1967, 39–40, 86–87).

In Chicago, Los Angeles, and elsewhere, the use of the tied-sale by real estate developers was born of necessity. Local governments and utilities lacked either the resources or the motivation to underwrite infrastructural development in outlying areas. Moreover, precedent gave developers good reason to gamble that infrastructure

could eventually be unloaded onto the government or entrepreneur who had a primary interest in the product. This encouraged neglect of strategies to finance the infrastructure as a permanent, even if money-losing, operation. It is fascinating to speculate how urban infrastructure would have evolved if the governmental alternative had not existed.

In making these speculations, the example of the private place offers an excellent starting point. Well after completion of the developmental process, the private place continued to be marketed as a planned, self-contained world where the homeowner could live in a cosmopolitan setting yet be free of the corruption and inefficiencies of the political sphere. Bitter experience with the political process encouraged developers and prospective residents alike to regard private ownership as the best available means to ensure the autonomy of the private place.

Urban designer Oscar Newman has likened private places to "small, independent cities" (Newman 1980, 125). This comparison has considerable merit. Private places carried on functions that everywhere else have been considered essential government services, including security forces, basic utilities, sewer systems, building codes, parks, and even, to a limited degree, legal systems. Moreover, covenants seem comparable in many ways to constitutions and associations to town meetings. Like local governments, there was a revenue system based in the last resort on a lien against the property of noncooperators. The sense of boundary, strong among private-place residents, also invites analogies to government.

Attempts to compare private places and government can be carried too far. Private places did not necessarily enjoy a perpetual existence and dozens shifted into the governmental sphere. Governments, of course, can also disappear, but the incidences of their demise are much rarer, as are the reasons: usually revolution, consolidation, or conquest. As economists Donald J. Boudreaux and Randall G. Holcombe put it, the private-place association is a type of "contractual government" and, as such, "the closest thing to a real-world social contract that can be found . . . because everyone

unanimously agrees to move into the contractual government's jurisdiction, so that the government is at no time imposed on anyone" (Boudreaux and Holcombe 1989, 275).

The first two decades of the twentieth century brought a culmination of private-place development. In 1905, Parkview was founded. Ultimately, its 250 homes made it the largest private subdivision in St. Louis. Parkview followed on the heels of University Heights, an even larger private place just west of the city limits. University Heights was the first private place to retain ownership of its own boulevards. Although previous developers had constructed thoroughfares, they had invariably dedicated them to the city. As a result, the private place and the street closed to through traffic had long been viewed as an inseparable package. Before University Heights, a private boulevard (or thoroughfare) would have seemed not only a needless frill, but a contradiction in terms.

The developer of University Heights advertised private ownership of these boulevards as a device for residents to maintain developmental control of their neighborhood. He promised that the boulevards, and all other streets, would be free from all telegraph, telephone, and electric poles. The indenture offered further protection by delegating broad powers to the trustees to regulate, by contract, the construction and design plans of "any person or corporation engaged in the business of furnishing electricity, heat, light, water, power, or gas" who used the street easement. In 1909, an advertisement proclaimed that a deal was being finalized with "a syndicate for operation of an electric bus line over the boulevards of University Heights." Under the proposed contract, residents would ride free and nonresidents would pay three cents, ensuring that "all our boulevards will remain private and free from street car lines."¹⁹

The large size of Parkview and University Heights encouraged developers to learn what city governments had long ago discovered. Ownership over the vast web of street easements represented the means to dominate the "commanding heights" of the local economy. It provided the legal and practical justification for municipal fran-

chise control and regulation of communications, electricity, and water supply.²⁰

Private ownership also had important implications for the structure and design of the utilities. An advertisement for University Heights boasted that, because the subdivision owned its own water mains, it did not depend on the unfiltered water of the city water works. It also stressed that University Heights piped in filtered water from a separate intake on the Missouri River. At one point, the developers of Parkview hoped to go still further through a plan to build a neighborhood heating and hot water plant. The details provided that steam and hot water be piped to each house through two pipes laid under the street, eliminating, in the words of the advertisement, "furnaces, fuel bills, ash bins and the like." Although the plant was never built (the reasons are unclear), the very fact that it was considered indicates a growing awareness that private ownership of the street easement offered some revolutionary possibilities.²¹

Privy vaults. In addition to the private street, another, more notorious, example of free market provision was the privy vault. I stress notorious because it has not been treated kindly by historians. The privy vault served as a temporary storage facility and was usually nothing more than a hole in the ground lined with brick or stone, usually located in the backyard of the residence. Throughout most of the nineteenth century, the privy vault, followed by its close cousin the cesspool, was the leading method of human-waste disposal for American cities. As late as 1880, two-thirds of urban households did not have access to a municipal sewer system (Tarr et al. 1984, 228–31; Tarr 1975, 601).

In most cities, private excavator companies sent wagons throughout the service area to clean out the "night soil" from each vault. To accomplish this disagreeable task, the workers used dippers and buckets and packed the night soil into barrels. What followed varied with the location. Sometimes the workers merely dumped the night soil into the nearest stream or lake. In many of the larger cities

(including New York and Baltimore), the excavator company mixed the night soil into a compost (commonly known as *poudrette*) and then sold it to farmers for use as a fertilizer. Although little is known about this process beyond scattered statistics here and there, it appears to have been extensive. In Brooklyn, farmers purchased an estimated twenty thousand cubic feet of night soil every year while Philadelphia annually disposed of twenty-two thousand tons in a similar manner. By the end of the century, however, the market for *poudrette* had dried up relative to that for chemical fertilizers. The reasons for, and extent of, this decline await further research.²²

Of all the cities employing this process, the case of Baltimore has been the most studied. There is good reason for this. Baltimore was the last major city to replace its privy vaults with a municipal sanitary sewer system. Until 1912, the Odorless Excavator Company had an exclusive franchise to empty the vaults of the city. The company received fees from individual householders to cart away the night soil and then sold it for 25 cents per load of two hundred gallons to a contractor, who, in turn, marketed the final product to farmers for \$1.67 per thousand gallons. Apparently about twelve million gallons per year were sold (Tarr 1975, 605; Howard 1924, 122–23; Allen 1899, 20).

Although many excavator companies, such as Baltimore's, enjoyed exclusive franchises, the privy vault is classified here under the free market category. My rationale has more to do with the nature of the good itself than with any specific political arrangement. Of all the examples discussed thus far, the privy vault resembled least the textbook definition of either a public good or a natural monopoly. The costs of exclusion were minimal, generally no more or less than for other private goods. Nor by any stretch of the imagination could the privy vault meet the definition of nonrivalrousness. Lastly, unlike the stereotypical natural monopoly, it was perforce highly decentralized and did not necessitate any direct or ongoing physical connection with the public street easement.²³

With Baltimore as a guide (in a subject largely bereft of case studies), what conclusions can be drawn about the effectiveness of

the privy vault as a waste-disposal system? The Odorless Excavator Company, of course, was quite happy with the arrangement. One booster of the company argued that it could safely empty "all sinks, cess-pools, wells, cellars, etc. . . without offense or danger of explosion."²⁴ At least on the matter of lack of offense, few claims could be more far fetched. In this respect, H. L. Mencken, a leading journalist from Baltimore, penned one of the most vivid descriptions about the actual workings of the system. Mencken recalled that during his childhood his family had a privy vault, or in his words a "powder-room," in the backyard under which lay a "shallow sink . . . that inspired my brother and me with considerable dread. Every now and then some child in West Baltimore fell into such a sink, and had to be hauled out, besmeared and howling, by the cops. The one in our yard was pumped out and fumigated" by a group of men "who arrived on a wagon that was called an O.E.A.—i.e., odorless excavating apparatus. They discharged this social-minded duty with great fervor and dispatch, and achieved non-odoriferousness . . . by burning buckets of rosin and tar. The whole neighborhood choked on the black, greasy, pungent smoke for hours afterward. It was thought to be an effective preventive of cholera, smallpox and tuberculosis" (Mencken 1940, 69–70).

Mencken seems to have been referring here to the traditional bucket-and-dipper brigades. By the early twentieth century, however, the system had become somewhat more sophisticated and began to employ less obnoxious vacuum hoses and pumps. Yet, despite these improvements, problems remained, most notably leakage. In theory privy vaults were sealed off, but the reality in Baltimore and elsewhere was often that they were leaky health hazards. Frequently the soil became saturated, polluting the groundwater and wells. As a result, the privy vault came in for criticism from both politicians and public health officials.

By the end of the nineteenth century, the days of the privy vault were numbered. Centralized municipal sewerage had become a panacea, benefiting from some powerful backers. As Joel Tarr has detailed, a potent "sanitary coalition" of engineers and public health

specialists led the charge for sewers across the country. The fact that members of this coalition staffed the emerging urban city-engineer and public health bureaucracies gave them considerable political clout. Their scientific and medical training guaranteed instant credibility with the powers that be. This was, after all, an era of nearly unbounded faith in "disinterested" expertise (Tarr et al. 1984, 239–50).²⁵

Against this sort of powerful opposition, the privy vault had few defenders beyond the obvious narrow interest of the night-soil companies. The critics had a field day. In 1896, for example, the health department of Baltimore excoriated the city's privy vaults as "the most dangerous enemies of our lives and happiness. The contents of these abominable receptacles have free access to the soil, and saturate the ground with liquid filth to such a degree that specimens of sub-soil water taken from different depths yield a large percentage of organic matters, the products of animal excretion."²⁶ By the early twentieth century, virtually every major city, including Baltimore, had abandoned privy vaults in favor of sewers.

Subsequent historians have tended to agree with the negative assessments voiced by contemporaries. Alan Anderson, for example, in his study of the origins of Baltimore's sewer system, lauded the abandonment of the labor-intensive, malodorous privy vault system and its replacement by a capital-intensive and centralized sewer technology that he assumes (at least by comparison) to have been clean and efficient (Anderson 1977, 50–51, 69, 85–86). With this information in hand, it would seem that the historian can rest assured that the verdict is in and that the privy vault stands condemned in the court of history: case closed.²⁷

A search beyond the bounds of the historical literature, however, muddies the picture considerably. A case in point is a study by John M. Kalbermatten, DeAnne S. Julius, and Charles G. Gunnerson produced for the World Bank in 1980. The findings cast serious doubt on the conventional wisdom of American historians and economists who have regarded the building of centralized sewers as a necessary by-product of civilized or economic development. The

authors compared several waste-disposal methods currently in use throughout the world. They note, for example, that only about 34 percent of the total Japanese population have sewers, while an even higher percentage rely on a highly modernized version of the privy vault (which includes a system of vacuum trucks). Unlike the more primitive type employed in nineteenth-century Baltimore, Japanese privy vaults are located inside the residence.

The authors chose Kyoto as their case study, a city where privy vaults serve 40 percent of the population, while another 40 percent use conventional sewers. They contend that privy vaults in Kyoto have several notable advantages over conventional sewers. First, they are cheaper to run. This is because privy vaults have lower recurrent costs (or day-to-day costs) than sewers. Virtually all urban historians and most economists have argued the opposite point of view. Indeed, low recurrent costs have been invariably portrayed as the *raison d'être* of sewers. A corollary to this perspective has been that sewers, as the quintessential capital-intensive technology, essentially run themselves. By the same token, privy vaults are said to have higher recurrent costs due to high labor intensity, that is, they have to be emptied every few weeks by a night-soil wagon, staffed by workers.

The real-life examples described by Kalbermatten and his coauthors tell a different story. Sewers do not simply run themselves but generate a whole set of recurrent costs, including consumption of large quantities of water, an increasingly expensive commodity these days. Forty percent of the water in a flush toilet, for example, is wasted. A second recurrent cost is the costly treatment plants needed by the average sewer system. The authors calculated that if added together, all these recurrent costs make sewers more than twice as expensive as privy vaults. Privy vaults also do not produce nearly as much water pollution as sewers, and in fact, from a public health standpoint, are equally safe. The authors argue that the failures of privy vaults and other alternatives to conventional sewerage "are usually attributable to poor design, inadequate education of users or lack of maintenance—problems that plague sewerage systems as

well." The solution seems to be mainly a matter of making sure that individual vaults are properly sealed (Kalbermatten, Julius, and Gunnerson 1980, 2, 30, 31, and Tables 3-3 and 3-4).

The Japanese experience illustrates that American urban historians and policy analysts need to take greater care lest they fall into the trap of methodological nationalism. Sometimes it may be necessary to do more than just compare two American cities before concluding that a particular event or process, such as the building of large centralized sewer systems, is inevitable. There is also a need for greater attention to international comparisons between, for example, the American and Japanese experiences. Should such a study ever be undertaken, possible questions to ask might include the following: Why did Americans choose to abandon the privy vault in favor of sewers, while the Japanese decided to improve their existing arrangements? Could it be that the Japanese were able to retain the privy vault because their legal system provided more effective protection from vault pollution than did the American common law? What relationship, if any, was there between the development of chemical fertilizers in the late nineteenth and early twentieth centuries in the United States and the decline of the privy vault? This may help to explain why organic fertilizers have historically been more prevalent in Japan than in the United States.²⁸

Another promising avenue for research is the impact of the water supply in each country. While I am not an expert on the Japanese story, there can be little doubt that the wide availability of water, combined with low prices, provided an important precondition for the demise of the privy vault in the United States. By the middle of the nineteenth century, many urbanites in the United States had not only installed water closets but their tendency to connect them with privy vaults created dangerous overflow problems (Tarr et al. 1984, 231).²⁹

It may be no coincidence that municipal ownership of water utilities frequently preceded the eclipse of the privy vault. In 1860, private companies owned 79 percent of all water works; by 1910, this had declined to 30 percent. One potential line of research would be

to explore whether municipal ownership led to artificially cheap water, thus helping to overload the waste-disposal system. There is some evidence that this may have occurred.³⁰ Indeed, one of the staple arguments used for municipalization was that it would guarantee consumers cheap water "freely and liberally, and without stint" (Blake 1956, 201). If viewed in this light, the predictions advanced by an advocate of private provision in Boston during the 1830s about the wasteful consequences of municipal ownership were prescient:

London is supplied by eight private companies, Boston has one. Let us have another and another, as our occasions require. Then every citizen who wants the water can have it, on fair terms—that is, if he will pay for it; and not by throwing a tax upon his fellow-man, who wants it not. We want enough for our present need, not a deluge, a preposterous expense, that every lady may have a fountain, and every gentleman a hose and squirter. . . . It is well, doubtless, to plan for posterity, but not too extensively (Blake 1956, 185).

As Kalbermatten and his coauthors note, research into both the history and current applications of alternative sewerage technologies such as the privy vault have special implications for developing countries. Most importantly, they call into question theories that conventional sewers are inevitable by-products of economic advancement. The Japanese example reveals that existing technologies can with some improvements be made entirely compatible with urbanization, industrialization, and environmental protection. Moreover, the authors point out that, unlike privy vaults, centralized sewer systems require massive investment costs not only to build but also to maintain.³¹

A Conclusive Beginning

Within all of these categories of private infrastructure—exclusive franchise, overlapping franchise, and free market provision, there are a multitude of possible research avenues to be explored. With the recent collapse in the credibility of statist models, including

central planning and government ownership, the history of private provision, once dismissed as not worth study, suddenly takes on new meaning. Most significantly, it illustrates that individuals in developing countries, in making their choices on how infrastructure will be provided, have an opportunity to learn from both the mistakes and the successes of the early experience with private provision by Americans and others.

3. For an excellent survey of the economic literature regarding public goods, see *The Theory of Market Failure*, especially the introductory chapter written by the volume's editor, Tyler Cowen (1988).

References

- Arrow, Kenneth. 1970. "Political and Economic Evaluation of Social Effects and Externalities." In *The Analysis of Public Output*, edited by Julius Margolis. New York: Universities-National Bureau of Economic Research, Columbia University Press.
- Cassirer, Ernst. 1946. *The Myth of the State*. New Haven: Yale University Press.
- Coase, R. H. 1988. "The Problem of Social Cost." Chapter 5 in *The Firm, the Market, and the Law*, edited by R. H. Coase. Chicago: University of Chicago Press. Reprinted from *The Journal of Law and Economics* 3 (October 1960): 1-44.
- Cowen, Tyler. 1988. "Public Goods and Externalities: Old and New Perspectives." In *The Theory of Market Failure: A Critical Examination*, edited by Tyler Cowen. Fairfax, Va.: George Mason University Press.
- Demsetz, Harold. 1969. "Information and Efficiency: Another Viewpoint." *Journal of Law and Economics* 12 (April): 1-22.
- Hayek, Friedrich A. 1960. *The Constitution of Liberty*. Chicago: University of Chicago Press; Phoenix Books, 1978.
- Jenkins, Jerry. 1991. "Capital Markets and Development: Essential and Irrelevant." In *Capital Markets and Development*, edited by Steve H. Hanke and Alan A. Walters. San Francisco: ICS Press.
- Maine, Henry. 1880. *Village Communities*. New York.
- Olson, Mancur. 1992. "The Hidden Path to a Successful Economy." In *The Emergence of Market Economies in Eastern Europe*, edited by Christopher Clague and Gordon C. Rauser. Cambridge, Mass.: Basil Blackwell.
- Rauschenbush, Stephen. 1939. *The March of Fascism*. New Haven, Conn.: Yale University Press.
- Schmidtz, David. 1991. *The Limits of Government: An Essay on the Public Goods Argument*. Boulder, Colo.: Westview Press.
- Wolf, Charles, Jr. 1988. *Markets or Governments: Choosing between Imperfect Alternatives*. Cambridge: MIT Press.

2. David T. Beito, "From Privies to Boulevards: The Private Supply of Infrastructure in the United States during the Nineteenth Century"

Notes

1. Robert Poole first popularized (and probably coined) the term *privatization* during the late 1970s (Poole 1980).
2. For a good sample of the new literature on private provision, see Public Works Historical Society 1989.

3. For more on the sliding scale of fees of private sewer companies, see Schultz 1929, 6-7, 11; and *Municipal Engineering* 11 (December 1896): 372.

4. Detroit Bureau of Governmental Research 1930, 97; Wilcox 1910, 454-55; and *The Municipal Yearbook* (1902), xxxiii, 97.

The private sewer company was already an endangered species by the turn of the century. In 1902, only 47 out of 1,524 urban areas with over three thousand in population had private sewer systems. New York: The Engineering News Publishing Company, 1902, *Municipal Yearbook* (1902), 27.

5. Lecture by Stephen Davies, "Private Provision of Public Goods in Great Britain During the Nineteenth Century," *The Rise of Western Legal and Economic Institutions*, 1991, Institute for Humane Studies, Belmont, CA; and telephone conversation with Stephen Davies, November 11, 1991.

As in the case of Great Britain, private water companies in the United States during the late nineteenth and early twentieth centuries especially thrived in smaller urban areas. In 1902, smaller urban areas with under thirty thousand people were far more likely to have private water works than were larger cities. A fascinating sidelight, deserving of more investigation, was that although municipal governments owned a majority of water works, private water companies owned a majority of filtration systems. *Municipal Yearbook* (1902), 13, 29.

6. In 1873, sanitarians estimated that the chemicals in human waste, including phosphorus and nitrogen, were worth between \$1.64 and \$2.01 per individual (Tarr 1975, 606).

7. Department of the Interior 1899, 80; *Sanitary Engineer* 9 (April 17, 1884): 474-77; and Rafter, 1897, 23-24.

8. From the standpoint of publicity and scientific interest, the highly publicized failure of the model sewage irrigation farm at Pullman, Illinois proved to be a major setback for the recycling movement. The changing attitudes toward Pullman, as well as sewage irrigation, during this period can be traced in the pages of the *Sanitary Engineer*. See, in particular, the contrast between the *Sanitary Engineer* 9 (April 17, 1884): 474-77 and the *Sanitary Engineer* 14 (June 17, 1886): 1.

9. Instead of building treatment plants, cities installed filtration at the intake to obtain clean drinking water. Under this method, the city purified the water only after it had been drawn from streams and rivers. At the same time, it continued to dump raw sewage into the nearest body of water, and downstream cities would then repeat the process (Tarr et al. 1984, 239-46).

10. In 1897, a writer for *Municipal Engineering* observed that in many cities, "instances are known where the death of one man made it practically impossible to find any part of the underground system [of wire and pipe under streets] without much unnecessary digging" *Municipal Engineering* 13 (December 1897): 360.

11. For more on these private streets, see Beito 1989, 1-47.

12. Constitution of 1875, Missouri, Article IX, Sections 15-25; Barclay 1962, 17; *The Scheme of Separation Between St. Louis City and County and the Charter of the City of St. Louis* (St. Louis: Daly Printing Company, 1888), 93; and *St. Louis Republic*, June 5, 1891, 7. As Jon C. Teaford points out, the electorate in St. Louis feared a return to the city government's lax fiscal record of the late 1860s and early 1870s, and thus

were particularly reluctant to approve charter amendments increasing taxes, debt, and spending (1984, 112–16).

13. *Missouri Republican*, May 22, 1869; *Missouri Republican*, March 7, 1888, 8; United States, Census Office, *Census Bulletin, Social Statistics of Cities*, no. 100, July 22, 1891, 15; and McShane 1979, 279–80.

The low percentage of improved streets in Cleveland may have been the byproduct of an aggressive annexation campaign. Many “streets” were nothing more than dirt rural roads. Compared with St. Louis, Cleveland enjoyed much greater autonomy in annexation, tax, debt, and spending issues (Teaford 1984, 86–92; and Teaford 1979, 26, 42–43, 61–62).

14. *Mirror* 10, September 20, 1900, 2. References also appear in the *Spectator*, September 21, 1889, 21; Board of Public Improvements, *Annual Report* (1884), 519; and *Realty Record and Builder* 14 (September 1907): 1.

15. *St. Louis Republic*, July 12, 1903, 8. Delos F. Wilcox, a leading authority on municipal franchises, reflected the dominant attitude when he blamed franchise holders for the “constant tearing up of the streets for the construction or repair of underground fixtures. It often seems astonishing that business can continue to be done in spite of these long-drawn-out and frequently-recurring interferences with the ordinary uses of the city highways” (Wilcox 1910, 122).

16. On public streets, the chief practical difficulty with laying utilities outside the curb lines was that the easement had to be directly acquired from each individual abutter. Under such a system, the developer, government official, and homeowner had a mutual incentive to rely on the “free” public street easement (Hodgkins 1899, 161–63; and Wilcox 1910, 91).

17. Grinder 1980, 92, 93, 98; Primm 1981, 358; McConachie 1976, 330; *St. Louis Republic*, May 5, 1895, 17; Parkview Association, Annual Report of President, May 1, 1922, 12–15 (Parkview Archives, in possession of Judy Little of Parkview); and Agreement between the Washington Terrace Trustees and Fred M. Williams, March 1925 (Washington Terrace Archives).

18. *Missouri Republican*, June 12, 1887, 5; *Missouri Republican*, May 13, 1888, 17; *St. Louis Globe Democrat*, April 24, 1892, 20; and *St. Louis Globe Democrat*, May 1, 1892, 20.

19. *St. Louis Republic*, April 12, 1908, Sec. 3, 3; *St. Louis Star*, April 4, 1909; *St. Louis Republic*, April 4, 1909, 15; University Heights, Subdivision No. 1, Declaration of Trust and Agreement, January 1905, Book 161, page 37, Recorder of Deeds, St. Louis County; and *St. Louis Star*, June 27, 1909.

20. Delos F. Wilcox expressed the spirit of the age when he asserted that “a settled conviction has been reached by a considerable number of citizens that the fundamental question in relation to franchises is, not compensation for the city or reduced rates to the consumer—or better service even—but rather the plain matter-of-fact problem on maintaining the city’s control over the streets” (1910, 5–6).

21. McMahan 1952; University Heights, Declaration, 19; *St. Louis Republic*, April 5, 1903, Sec. 2, 7; *St. Louis Republic*, June 19, 1904, Sec. 3, 2; and *St. Louis Republic*, April 29, 1906, Sec. 5, 10.

22. City of Baltimore, *Report of the Sewerage Commission* (1897), 21–22; Tarr 1975, 602; and Wines 1985, 28–30.

23. The franchise of Baltimore’s Odorless Excavator Company may not have been so exclusive after all. Business directories in Baltimore during the period showed several dozen firms involved in night-soil removal (Euchner 1987, 10).

24. *Illustrated Baltimore: The Monumental City* (New York: American Publishing and Engraving, 1890), 126.

25. On the political power of the engineering profession during this period, historian Stanley K. Schultz argues that through “the creation of administrative bureaucracies, engineers apparently were the earliest municipal officials to achieve anything like job security” (Schultz and McShane 1977, 399).

26. City of Baltimore, *The Mayor’s Message and Reports of the City Officers* (1896), 908.

27. Although Charles Euchner, in a well-researched study of the transition from privy vaults to sewers in Baltimore, argues that Anderson unduly ignores the lobbying influence of business interests in bringing about the transition to sewers, he appears to agree with him on other matters: “The cesspool [or privy vault] system of sewage disposal was not only land-intensive but also labor-intensive, and great economies were available in shifting to a capital-intensive system. . . . Paying for such a [centralized sewer] system would require only one major payment [and] maintenance costs would be minimal” (1987, 48, 51).

28. It should be noted that the use of night soil for fertilizer has become increasingly rare in Japan since the introduction of chemical fertilizers after World War II (Trewartha 1965, 208–9). Most of the night soil produced by Japanese privy vaults is either incinerated or turned into sludge. But while night-soil-based fertilizers have been on the decline in Japan, they remain popular in Taiwan. It has been estimated that both private and public night-soil collectors are able to sell over 80 percent of their supply each year, mostly to fish farmers (Kalbermatten, Julius, and Gunnerson 1980, 48).

In his history of fertilizer, Richard Wines speculates (in a provocative aside that merits further research) that the shrinking supply of night soil during the late nineteenth century helped bring about a decline in the market for organic fertilizers such as *poudrette* (1985, 30).

29. Cultural differences may also have been important. Susan Hanley has found evidence indicating that as early as the seventeenth century the Japanese easily exceeded their European and American counterparts in sanitary cleanliness and night-soil recycling (Hanley 1987, 16–19).

30. Blake 1956, 185, 201, 267; and Schultz and McShane 1977, 393. Tarr details the enormous increase in per capita water use in Chicago, Cleveland, and Detroit (all with municipal systems) during the late nineteenth century. Unfortunately, nobody has undertaken a comparison between the degree of water usage of municipal and private water works (Tarr 1979, 310–2). Blake argues, by contrast, that “the increasing urban consumption of water reflected not so much willful waste as high standards of living” (1956, 269).

31. According to Kalbermatten, Julius, and Gunnerson, the "lack of interest in sanitation technologies other than sewerage is in part because of the standardized education of most planners and engineers in developing countries. Engineers are trained in sophisticated (and intellectually stimulating) advanced technology that is, in a sense, self perpetuating" (1980, 2).

References

- Allen, Kenneth. 1899. "The Sewerage of Baltimore." *Municipal Engineering* 16 (January).
- Anderson, Alan D. 1977. *The Origin and Resolution of an Urban Crisis: Baltimore, 1890-1930*. Baltimore: Johns Hopkins University Press.
- Armstrong, Christopher, and H. V. Nelles. 1986. *Monopoly's Moment: The Organization and Regulation of Canadian Utilities, 1830-1930*. Philadelphia: Temple University Press.
- Baker, Moses N. 1896. *Sewerage and Sewage Purification*. New York: Van Nostrand.
- Barclay, Thomas S. 1962. *The St. Louis Home Rule Charter of 1876: Its Framing and Adoption*. Columbia: University of Missouri Press.
- Baumol, William J., John C. Panzer, and Robert D. Willig. 1982. *Contestable Markets and the Theory of Industry Structure*. New York: Harcourt Brace Jovanovich.
- Beito, David T. 1989. "Owning the 'Commanding Heights': Historical Perspectives on Private Streets." In *Essays in Public Works History*, 1-47. Chicago: Public Works Historical Society, no. 16.
- Blake, Nelson Manfred. 1956. *Water for the Cities: A History of the Urban Water Supply Problem in the United States*. New York: Syracuse University Press.
- Boudreaux, Donald J., and Randall G. Holcombe. 1989. "Government by Contract." *Public Finance Quarterly* 17 (July).
- Buchanan, James M., and Roger L. Faith. 1981. "Entrepreneurship and the Internalization of Externalities." *Journal of Law and Economics* 24 (April).
- Demsetz, Harold. 1970. "The Private Production of Public Goods." *Journal of Law and Economics* 13 (October): 293-306.
- Department of the Interior. United States Geological Survey. 1899. *Water Supply and Irrigation Papers*. No. 22. Washington, D.C.: Government Printing Office.
- Detroit Bureau of Governmental Research. 1930. *The Government of the City of Atlantic City, New Jersey*. Detroit.
- Euchner, Charles Christopher. 1987. "The Politics of Urban Expansion: Baltimore and the Sewerage Question." M.A. thesis, Johns Hopkins University.
- Fogelson, Robert M. 1967. *The Fragmented Metropolis: Los Angeles, 1850-1930*. Cambridge: Harvard University Press.
- Grinder, R. Dale. 1980. "The Battle for Clean Air: The Smoke Problem in Post-Civil War America." In *Pollution and Reform in American Cities, 1870-1930*, edited by Martin V. Melosi. Austin: University of Texas Press.
- Hanley, Susan B. 1987. "Urban Sanitation in Preindustrial Japan." *Journal of Interdisciplinary History* 18 (Summer).

- Hardin, Garrett. 1977. "The Tragedy of the Commons." In *Managing the Commons*, edited by Garrett Hardin and John Baden. San Francisco: W. W. Freeman.
- Hodgkins, H. C. 1899. "The Economic Arrangement and Construction of Sub-Structures in Streets." In *Report of Proceedings of the American Water Works Association* 19 (May 16-19).
- Howard, William Travis. 1924. *Public Health Administration and the Natural History of Disease in Baltimore, Maryland, 1797-1920*. Washington, D.C.: Carnegie Institution of Washington.
- Hunter, Julius K. 1982. *Kingsbury Place: The First Two Hundred Years*. St. Louis, Mo.: C. V. Mosby Company.
- Jackson, Kenneth T. 1985. *Crabgrass Frontier: The Suburbanization of the United States*. New York: Oxford University Press.
- Kalbermatten, John M., DeAnne S. Julius, and Charles G. Gunnerson. 1980. *Appropriate Technology for Water Supply and Sanitation: Technical and Economic Options*. Washington, D.C.: World Bank.
- Keating, Ann Durkin. 1985. "From City to Metropolis: Infrastructure and Residential Growth in Chicago." In *Infrastructure and Urban Growth in the Nineteenth Century*. Chicago: Public Works Historical Society.
- . 1988. *Building Chicago: Suburban Developers and the Creation of A Divided Metropolis*. Columbus: Ohio State University Press.
- Klein, Daniel B. 1990. "The Voluntary Provision of Public Goods? The Turnpike Companies of Early America." *Economic Inquiry* 28 (October): 788-812.
- Klein, Daniel B., and John Majewski. 1991. *Economy, Community, and Law: The Turnpike Movement in New York, 1797-1845*. Working Paper no. 76. Berkeley: University of California Transportation Center.
- MacCallum, Spencer. 1970. *The Art of Community*. Menlo Park: Institute for Humane Studies.
- McConachie, Alexander Scott. 1976. "The 'Big Cinch': A Business Elite in the Life of a City, St. Louis, 1895-1915." Ph.D. dissertation, Washington University.
- McMahan, Howard. 1952. "An Administrative History of University City." M.A. thesis, University of Kansas.
- McShane, Clay. 1979. "Transforming the Use of Urban Space: A Look at the Revolution in Street Pavements, 1880-1924." *Journal of Urban History* 5.
- Mencken, H. L. 1940. *Happy Days*. New York: Alfred A. Knopf.
- Newman, Oscar. 1980. *Community of Interest*. New York: Doubleday, Anchor Books.
- Olson, Mancur. 1965. *The Logic of Collective Action: Public Goods and the Theory of Groups*. Cambridge: Harvard University Press.
- Platt, Harold L. 1983. *City Building in the New South: The Growth of Public Services in Houston, Texas, 1830-1915*. Philadelphia: Temple University Press.
- Poole, Robert W., Jr. 1980. *Cutting Back City Hall*. New York: Universe Books.
- Primm, James Neal. 1981. *Lion of the Valley: St. Louis, Missouri*. Boulder, Colo.: Pruett Publishing Company.
- Public Works Historical Society. 1989. *Public-Private Partnerships: Privatization in Historical Perspective*. Chicago.

- Rafter, George W. 1897. *Sewage Irrigation*. Washington, D.C.: Government Printing Office.
- Rafter, George W., and Moses N. Baker. 1894. *Sewage Disposal in the United States*. New York: Van Nostrand.
- Savage, Charles. 1987. *Architecture of the Private Streets of St. Louis: The Architects and the Houses They Designed*. Columbia: University of Missouri Press.
- Schultz, E. B. 1929. "A Privately Owned Sewerage System." *Michigan Municipal Review* 2 (January).
- Schultz, Stanley K., and Clay McShane. 1977. "To Engineer the Metropolis: Sewers, Sanitation and City Planning in Late-Nineteenth-Century America." *Journal of American History* 65 (September).
- Tarr, Joel. 1975. "From City to Farm: Urban Wastes and the American Farmer." *Agricultural History* 46 (October).
- . 1979. "The Separate vs. Combined Sewer Problem: A Case Study in Urban Technology Design Choice." *Journal of Urban History* 5 (May).
- Tarr, Joel, James McCurley III, Francis C. McMichael, and Terry Yosie. 1984. "Water and Wastes: A Retrospective Assessment of Wastewater Technology in the United States, 1800–1932." *Technology and Culture* 25 (April).
- Teaford, Jon C. 1979. *City and Suburb: The Political Fragmentation of Metropolitan America, 1850–1970*. Baltimore: Johns Hopkins University Press.
- . 1984. *The Unheralded Triumph: City Government in America, 1870–1900*. Baltimore: Johns Hopkins University Press.
- Trewartha, Glenn T. 1965. *Japan: A Geography*. Madison: University of Wisconsin Press.
- Vickery, Robert L. 1972. *Anthropysical Form: Two Families and Their Neighborhood Environments*. Charlottesville: University Press of Virginia.
- Wilcox, Delos F. 1910. *Municipal Franchises: A Description of the Terms and Conditions Upon Which Private Corporations Enjoy Special Privileges in the Streets of American Cities*. Rochester, N.Y.: Gervaise Press.
- Wines, Richard A. 1985. *Fertilizer in America: From Waste Recycling to Resource Exploitation*. Philadelphia: Temple University Press.

3. Tina West and Elinor Ostrom, "Consent and the Provision of Local Public Goods and Services: Some Reflections from Ghanaian and Nigerian Experiences"

Notes

1. Margaret Levi uses the term *quasi-voluntary compliance* to describe the behavior of taxpayers in systems where most taxpayers comply with the obligations imposed on them by governments. She argues that paying taxes is voluntary in the

sense that individuals choose to comply in many situations in which they are not being directly coerced. On the other hand, it is quasi-voluntary because the noncompliant are subject to coercion—if they are caught (1988, Chapter 3).

2. The two authors were part of a team studying the effect of structural adjustment policy reforms on local services in Ghana, the Ivory Coast, and Nigeria. In Nigeria, they were joined by Dele Ayo, Obafemi Awolowo University; Kenneth Hubbell, University of Missouri; and Dele Olowu, Obafemi Awolowo University. In Ghana, Tina West was joined by David Green, Associates in Rural Development, based in Burlington, Vermont; Chris Schwabe, Syracuse University; and Felix Fiadjoe, University of Ghana at Lagon. A final report from this study is currently under preparation.

3. For early discussions of these concepts, see Musgrave 1959; and Ostrom, Tiebout, and Warren 1961. For applications of these concepts, see Ostrom, Parks, and Whitaker 1978; Advisory Commission on Intergovernmental Relations 1987; 1988; Ostrom, Bish, and Ostrom 1988.

4. Other attributes of public goods and services are discussed in Ostrom and Ostrom 1977; and Ostrom, Schroeder, and Wynne (forthcoming).

5. The problem of rent seeking is almost endemic in much of Africa. Amos Sawyer stresses the perverse effect on Liberian government and society of an overreliance on rents.

The impact of these arrangements on the society was profound. First, they increased the capabilities of the government in a manner that further strengthened institutional capacities at the center. The proprietary role of the government—the president, in other words—was enormously increased. Reliance on rents, royalties, and profits gave the presidency an independent existence, with the capability to operate without any of the pretensions of accountability that would have been required had the president been dependent on income or other taxes raised directly from the people. (1992, 261)

6. In some settings, nongovernmental entities may impound property until duties are fulfilled, and physical violence is not unknown as a method to enforce community-level, collective-choice decisions.

7. See Kiser and Ostrom 1982; and Ostrom 1990 for further clarification of the concepts of operation, collective choice, and constitutional choice.

The research for this paper was done under the auspices of the "Decentralization: Finance and Management" (DFM) project, sponsored by the Office of Rural and Institutional Development of the Bureau for Science and Technology (S&T/RD) of the U.S. Agency for International Development (USAID). The authors wish to thank the DFM project and USAID for their support, but to stress that the opinions expressed in this paper are those of the authors alone, and not necessarily those of the DFM project or USAID.